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### **THE DISCOVERY OF A PORTAGE FAUNA IN THE MACKENZIE RIVER VALLEY**

by

E. M. Kindle.

### **NEW SPECIES OF PELECYPODS FROM THE CRETACEOUS OF NORTHERN ALBERTA**

by

F. H. McLearn.

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*THE DISCOVERY OF A PORTAGE FAUNA IN THE MACKENZIE  
RIVER VALLEY.*

By E. M. KINDLE.

INTRODUCTION.

One of the results of the Canadian Geological Survey expedition to the Mackenzie river in 1917, under the writer's direction, was the discovery of a Portage fauna in the Devonian shales of the upper Mackenzie valley. The absence of this fauna from the earlier collections made in the Mackenzie valley by McConnell was doubtless one of the reasons which lead Whiteaves<sup>1</sup> to conclude that "the subdivisions of the Devonian system that exist in the state of New York and in Ontario are probably not recognizable" in the Mackenzie River district. The merging in Whiteaves' report of the *Spirifer disjunctus* fauna from Hay river and the *Stryngocephalus* fauna from the Ramparts—localities several hundred miles apart—into a single fauna, very effectively masked such resemblances to the New York section as they individually possessed.

It now appears that the fauna of the lower part of the Mackenzie River Devonian has little or no relationship to that in the sections of eastern America, whereas the upper Devonian faunas of the Mackenzie section are closely related to those of the New York section. The relationship of the latest or *Sp. disjunctus* fauna of the region to the New York Chemung will be discussed elsewhere. The purpose of this report is to show that in the Mackenzie River section the *Sp. disjunctus* fauna is preceded by a fauna which correlates with the Portage of New York.

It may be noted here that Dr. J. M. Clarke<sup>2</sup> in his admirable memoir on the Portage fauna of New York refers to a black shale 150 feet thick at the mouth of Clearwater river on Athabaska river, and its supposed equivalents to the northwest which he intimates hold the position in that region of the Genesee-Portage faunas. In this interpretation he accepted in some degree the opinion of Meek<sup>3</sup> who in turn was misled by the mistake of

<sup>1</sup>"The fossils of the Devonian rocks of the Mackenzie River basin," Geol. Surv., Can., p. 257. Cont. to Can. Pal. vol. I, pt. III, 1891, pp. 197-253, pls. 27-32.

<sup>2</sup>"Naples fauna in western New York." N.Y. State Mus. Mem. No. 6, 1904, pp. 376.

<sup>3</sup>"Remarks on the geology of the Mackenzie river," etc. Trans. Chicago Acad. Sc., vol. I, pt. I, 1867, p. 63.

Richardson<sup>1</sup> and Isbester.<sup>2</sup> These authors, who were the first to write on the geology of the region, referred the beds following the Devonian limestone at the mouth of Clearwater river to the Marcellus shales, a determination based on fossils collected several hundred miles away and evidently from a very different horizon. This bituminous formation was fully described by McConnell<sup>3</sup> as the tar sand and referred to the Cretaceous. There appears to be no doubt of its Mesozoic age. The name McMurray formation has recently been given to it by McLearn.<sup>4</sup>

### STRATIGRAPHIC RELATIONS.

On the northeastern bank of Mackenzie river, opposite Simpson, greenish grey clay shale outcrops in horizontal beds exposing a thickness of about 140 feet. This shale is without limestone bands and is almost or quite free from sandstone bands. It weathers to small flakes of fissile shale. Excellent exposures of this shale occur on both sides of the Mackenzie about 20 miles above Simpson. Along this part of the river the banks expose sections from 50 to 150 feet thick. Fossils are very rare except in certain narrow bands of the shale which were located only after considerable searching. Because of the excellent exposures of this shale near Simpson, A. E. Cameron has called them the Simpson shales.<sup>5</sup> Neither the top nor the bottom of this formation has been observed, but the beds which immediately follow are well exposed in the Hay River section on the south side of Great Slave lake and carry the *Spirifer disjunctus* fauna. The latest beds preceding it which have been observed in the Great Slave Lake section are those outcropping on the south shore at Sulphur point.

A small outcrop of the Simpson shale occurs on the west bank below the glacial till about 12 miles below Simpson and  $2\frac{3}{4}$  miles below Martin river.

At station 5720 on the east bank of Mackenzie river, about 5 miles above Rabbitskin river, fossils were found in a section exposing about 65 feet of greenish to bluish grey shales. These include the following species:

*Cyrtina glabra* n. sp.  
*Buchiola retriostrata*  
*Paracardium doris*?  
*Entomis serratostrata*  
*Entomis variostrata*

The most northerly locality at which the Portage fauna was found is about 150 miles below Simpson on the east bank of Mackenzie river. At this locality, station 2729, which is 11 miles below Old Fort Wrigley and opposite the lowest of four islands, 40 or 50 feet of dark, lead grey, rather soft shales outcrop which furnished the following species:

*Buchiola retriostrata*  
*Buchiola dilata* n. sp.

<sup>1</sup>Journal of a boat voyage through Ruperts Land, vol. I, 1851, pp. 122, 177.

<sup>2</sup>Jour. Geol. Soc. Lond., vol. XI, 1855, pp. 509-510.

<sup>3</sup>Geol. Surv., Can., Ann. Rept., vol. V, pt. I, 1893, pp. 32D-36D.

<sup>4</sup>Geol. Surv., Can., Sum. Rept., 1916, p. 147.

<sup>5</sup>Geol. Surv., Can., Sum. Rept., 1917, pt. C, p. 26.

*Ontaria clarkei*

*Paraptyx* cf. *ontario*.

*Styliolina fissurella*

*Tentaculites mackenziensis* n. sp.

*Bactrites aciculum*

*Buchiola retriostriata* is an abundant species in each of the faunules and it differs in no way from the characteristic and widely distributed *B. retriostriata* of New York Portage.

### CORRELATION.

The rather meagre character of this fauna is a conspicuous feature which is probably destined to largely disappear with additional collecting, just as it has in the case of the New York Portage fauna now embracing nearly 200 species, which, according to Dr. Clarke,<sup>1</sup> at the close of the first survey of that state comprised "but a handful of species." Future work in the Mackenzie valley will no doubt add numerous species to those at present known. Casual examination of the beds holding this fauna would lead one to consider them as "essentially barren of organic remains" just as the New York Portage beds were originally characterized.

Corals, which comprise an important element of the Devonian faunas above and below the Simpson shale, are unknown in it. Their absence from this horizon recalls a similar peculiarity of the Portage fauna of New York which also lacks the coral element. This characteristic may be due to the low temperature<sup>2</sup> which has been attributed to the Portage sea in New York.

Evidence of crinoidal life in the fauna is likewise meagre, the collection showing only some fragments of a very fragile type of crinoid arm. The paucity of this element of the fauna is another reminder of the New York Portage.

The only brachiopod found in the fauna is a new species of *Cyrtina* which is without resemblance to any species in either the faunas above or below the Simpson shale. This fossil contributes nothing toward indicating the affinities of the fauna, but helps to emphasize its contrast with the other faunas of the section.

None of the fossils perhaps have greater significance with reference to the correlation of the fauna than two species of *Entomis*—*E. variostriata* and *E. serratostriata*. Both are characteristic of horizons corresponding to the New York Portage on both sides of the Atlantic. One of these, *Entomis serratostriata*, is a well known index species of the fauna in Europe. The pelecypods of the Simpson shale fauna include two species which are among the most characteristic and widely distributed fossils of the cosmopolitan *Manticoceras intumescens* fauna.<sup>3</sup> These are *Buchiola retriostriata* and *Ontaria clarkei*. *B. retriostriata* has a world-wide distribution, occurring in the Urals, the western European province, and throughout the Appalachian and New York provinces of the Portage. This fossil is reported by Clarke to be the most abundant, with one exception, in the Portage of New

<sup>1</sup>Ibid p. 377.

<sup>2</sup>Clarke, J. M., "Strand and undertow markings of upper Devonian time as indications of the prevailing climate." N. Y. State Mus. Bull. 196, pp. 199-238, pls. 7-29.

<sup>3</sup>N. Y. State Geol., 16th Ann. Rept., 1896, p. 41.

York. The writer has likewise found it to be the most abundant species in the Portage horizon from central Pennsylvania<sup>1</sup> to southwest Virginia.<sup>2</sup> This species is also one of the most abundant in the Simpson shale fauna. Because of the very wide geographic distribution of this fossil and its dominance in the fauna we may conveniently designate the fauna as the *Buchiola retriostrata* fauna. *Ontaria clarkei*, another pelecypod of this fauna, is also common to the New York and European *Manticoceras* faunas.

The relation of this fauna to other faunas of the region is indicated below.

Upper Devonian—*Spirifer disjunctus* fauna, Hay River section.  
*Buchiola retriostrata* fauna, Mackenzie River section.

Middle Devonian—*Stringocephalus burtini* fauna, Great Slave Lake section.

Another fauna not yet sufficiently studied to permit detailed characterization appears to lie between the *Buchiola retriostrata* and *Stringocephalus* faunas.

It is probable that the Portage fauna has a wide distribution in the region to the westward of Mackenzie river. The writer<sup>3</sup> collected a specimen of *Buchiola retriostrata* on Yukon river below Eagle, some years ago. Collections made by Mr. Burling from the Canadian Alaskan boundary north of the Yukon also show a Portage fauna.<sup>4</sup>

We do not as yet know how the Portage sea of the Mackenzie-Yukon region was connected with the synchronous marine basin which occupied the upper Mississippi, Wabash, and New York area. The sections of the intermediate region along Athabaska river and in Manitoba show no trace of this fauna.

## DESCRIPTION OF THE FAUNA.

### BRACHIOPODA.

#### *Cyrtina glabra* n. sp.

Plate I, figures 1, 2, and 3.

Shell small with subpyramidal pedicle valve (apparently depressed because of crushing). Sides of ventral valve sloping regularly to the margin with a broad shallow sinus not reaching quite to the beak. Brachial valve convex in the umbonal and median portion and slightly convex near the anterior and lateral margins. Fold on pedicle valve showing only at front margin of shell. Cardinal area transversely striated and inclined forward. Deltidial plate not observed. Deltidial opening extending to the apex.

The perfectly smooth surface of this shell distinguishes it from other species of *Cyrtina*.

The species is represented by a single specimen only.

*Horizon and Locality.* Simpson shale; bank of Mackenzie river 5 miles above Rabbitskin river.

<sup>1</sup>U.S. Geol. Surv., Bull. No. 244, 1903, pp. 91-92.

<sup>2</sup>U.S. Geol. Surv., Bull. No. 508, 1912, p. 88.

<sup>3</sup>Brooks, R. A., and Kindle, E. M., "Palæozoic and associated rocks of the upper Yukon, Alaska," Bull. Geol. Soc. Amer., vol. 19, 1908, p. 288.

<sup>4</sup>Geol. Surv., Can., Sum. Rept., 1913, p. 317.



## PELECYPODA.

*Ontaria clarkei* Beushausen.

Plate I, figure 8.

*Ontaria clarkei* Clarke, N.Y. State Mus., Mem. No. 6<sup>1</sup>, pt. 2, p. 288, pl. 7, figs. 10-20.

The collection includes several somewhat fragmentary specimens which are referred to this species. The two detached valves shown in Plate I, figure 8, have about 130 fine radiating striæ without concentric striæ. The general features of the shell are indicated by the figure.

*Horizon and Locality.* Simpson shale, 5 miles above Rabbitskin river, Mackenzie river.

*Paraptyx cf. ontario* Clarke.

Plate I, figure 9.

*Paraptyx ontario* Clarke, N.Y. State Mus., Mem. No. 6, pt. 2, p. 262, pl. 7, figs. 1-8.

A single fragmentary specimen which is comparable and possibly identical with this species is shown in Plate I, figure 9. It is marked by about one hundred and fifty fine radiating striæ without concentric lines. The figure fails to show the three or four rather indistinctly defined striæ at the left of the beak above the angular ridge on the slightly upcurved crescent. The very slight angle which these make with the angular ridge bordering the crescent appears to be due to the crushing of the shell.

*Horizon and Locality.* Simpson shale; Mackenzie river 5 miles above Rabbitskin river.

*Buchiola retriostrata* V. Buch.

Plate I, figures 4, 5, and 6.

*Buchiola retriostrata* Clarke, N.Y. State Mus., Mem. No. 6, pt. 2, p. 290; pl. 10, figs. 1-14.

This shell shows no material modifications of the features which characterize it in the Portage beds of New York. In a few specimens the number of ribs is slightly greater than the New York shells ordinarily show. The specimen illustrated in Plate I, figure 4, shows seventeen as the maximum number which has been observed. The great majority of the shells have ten to fourteen ribs marked by the retral curving striæ shown clearly in Plate I, figures 5 and 6. This is the most abundant species in the fauna.

*Horizon and Locality.* Simpson shale; Mackenzie river 5 miles above Rabbitskin river.

<sup>1</sup>Citations of synonymy will be limited usually to a single author, giving figures or descriptions of value for comparison.

*Buchiola dilata* n. sp.

Plate I, figure 7.

Outline and general features as shown in the figure. This shell differs from *B. retriostrata* in the character of the ornamentation on the radiating ribs. The transverse retrally curved ridges which cross the radiating plications are coarser and much more widely spaced in this shell than in *B. retriostrata*. The total number of these transverse ridges on the longer ribs does not exceed ten or twelve, whereas on a normal specimen of *B. retriostrata* there are two and a half to three and a half times that number. This shell bears some resemblance in the wide spacing of these ridges to *B. halli*, but the absence of the fine concentric lines which cover the nodes of that species distinguishes the two.

The species is known only from the single specimen figured.

*Horizon and Locality.* Simpson shale; Mackenzie river 5 miles above Rabbitskin river.

*Paracardium doris* Hall?

*Paracardium doris* Hall, Pal. N.Y. 1885, vol. V, pt. I, p. 428, pl. 70, figs. 10-11.

The collection contains a single fragmentary shell which probably belongs to this species.

*Horizon and Locality.* Simpson shale; 5 miles above Rabbitskin river.

## PTEROPODA.

*Styliolina fissurella* Hall.

*Styliolina fissurella* Hall, Pal. N.Y., vol. V, pt. II, p. 178, pl. 31A, figs. 1-36.

This minute, needle-like pteropod occurs sparingly. It is unknown in this fauna in the extreme abundance which characterizes its presence in some of the dark shales of the upper Devonian in New York, probably because this dark shale facies appears to be absent from the Portage of Mackenzie River province.

*Horizon and Locality.* Simpson shale; Mackenzie river, 11 miles below Wrigley.

*Tentaculites mackenziensis* n. sp.

Plate I, figure 11.

Shell conical with a very attenuate apical part which slightly expands about 1 mm. above the tip of the cone. Length about 5 mm. and width at the aperture 1 mm. Annulations very fine and closely placed extending to the tip of the cone. They increase regularly in size to the aperture and number about 100. Longitudinal striæ are absent.

This species differs from *T. tenuicinctus* in its more rapid expansion, its width at the aperture being about three times that of *T. tenuicinctus*.

From *T. speculus* and *T. attenuatus* it differs in having much finer annulations and in the absence of the fine, intermediate striæ which characterize these two species.

*Horizon and Locality.* Simpson shale; below Wrigley 11 miles.

#### CEPHALOPODA.

*Bactrites aciculum* (Hall).

Plate I, figure 10.

*Coleolus aciculum* Hall, Pal. N.Y., vol. V, pt. II, p. 187, pl. 32A, figs. 11-16.

*Bactrites aciculum* Clarke, N.Y. State Geol., 16th Ann. Rept., 1896, p. 160, pl. 9, figs. 17-19.

The fragile cones of this shell are among the most common fossils in the fauna. They seldom show any markings except the longitudinal fracture lines induced by crushing, which are generally present. A few annulations spaced about  $\frac{1}{2}$  mm. apart have been observed on a single individual.

*Horizon and Locality.* Simpson shale; Mackenzie river 5 miles above Rabbitskin river.

#### OSTRACODA.

*Entomis variostriata* Clarke.

Plate II, figures 1, 2, and 3.

*E. variostriata* T. R. Jones, Ann. Mag. Nat. Hist., vol. VI, 1890, p. 323, pl. XI, figs. 5-8.

*E. variostriata* T. R. Jones, Ann. Mag. Nat. Hist., vol. IV, 1879, p. 182, pl. XI, figs. 1, 5, 7, 11-14, 16.

Outline of shell as shown on Plate II is somewhat variable. The surface sculpture consists of sharply elevated concentric lines which fork at intervals and sometimes terminate abruptly. The delicate branching striæ between these lines, described by Jones, have not been observed probably because of the less perfect preservation of the surface characters. This is a very abundant fossil in certain strata.

*Horizon and Locality.* Simpson shale; Mackenzie river 5 miles above Rabbitskin river.

*Entomis serratostriata* (Sandberger).

Plate II, figures 4, 5, and 6.

*Entomis serratostriata* Jones, Ann. Mag. Nat. Hist., vol. VI, 1890, p. 320, pl. XI, figs. 1a, b, 2a, b.

The essential characters of this little oval ostracode are shown in Plate II. It occurs abundantly in association with *E. variostriata*.

*Horizon and Locality.* Simpson shale; Mackenzie river 5 miles above Rabbitskin river.

*Entomis brookei* n. sp.

Plate II, figures 7, 8, 9, and 10.

This species is characterized by surface ornamentation of diverse character consisting of areas of coarse and fine lines. The central part of the carapace bears a coarse sculpture comparable with that of *E. variostriata*. This merges rather abruptly into a much finer variety of striæ which extends to the margin of the shell. These sharply contrasted types of ornamentation distinguish this ostracode from any other species known to me. This species is named for R. A. Brooke, who assisted in collecting this fauna.

*Horizon and Locality.* Simpson shale; Mackenzie river 5 miles above Rabbitskin river.

NEW SPECIES OF PELECYPODS FROM THE CRETACEOUS  
OF NORTHERN ALBERTA.

By F. H. McLEARN.

INTRODUCTION.

The species described below are in part from the Colorado group and in part from a group of Lower Cretaceous<sup>1</sup> age. The Colorado, as here delimited, includes the Pelican shale, Pelican sandstone, and Lower La Biche formation in the Athabaska valley; and the St. John and Dunvegan formations and the lower shale and Bad Heart sandstone members of the Smoky River formation in the Peace valley. The group of Lower Cretaceous age embraces the McMurray tar sands, Clearwater and Grand Rapids formations in the Athabaska valley, and the Loon River and Peace River formations in the Peace valley.

Acknowledgment is made to Dr. T. W. Stanton for advice in the interpretation of the fossils.

DESCRIPTION OF SPECIES.

Order, *Priondesmacea* Dall.

Family, *NUCULIDÆ* Adams.

Genus, *Nucula* Lamarck.

*Nucula dowlingi* n. sp.

Plate III, figures 1, 2.

*Description.* In general form and radiating surface sculpture this species resembles *Nucula pectinata* Sowerby, from the British Gault formation; but the beaks are consistently even more posterior in position and curve backward. Compared with the Montanan species *N. cancellata* Meek and Hayden, the beaks of the St. John species are more posterior in position and the lunule is relatively broader. Height 15 mm., length 19 mm. This species is named after D. B. Dowling of the Geological Survey, Canada.

*Horizon.* Common in the St. John formation, below Cache creek on Peace river, British Columbia.

*Collection.* Victoria Memorial Museum; holotype, Cat. No. 5394.

Family, *PARALLELODONTIDÆ* Dall.

Genus, *Dicranodonta* Woods.

*Dicranodonta dowlingi* n. sp.

Plate III, figures 3, 4, and 5.

*Description.* The nearest species is *Dicranodonta obliqua* (Keeping) from the lower Greensand (Aptian) of Upware; compared with it the Peace River species is larger, more obtuse, not flattened centrally, has a

<sup>1</sup>In the sense of pre-Cenomanian Cretaceous.

slightly longer hingeline, more numerous central teeth, and lacks the fine radiating striæ of the English species. The short hingeline, the curving down of the laterals, and the rounded outline place it in the genus *Dicranodonta*. Height 42 mm., length 52 mm. This species is named after D. B. Dowling.

*Horizon.* Rare in the Peace River formation, Peace river, Alberta.

*Collection.* Victoria Memorial Museum; holotype, Cat. No. 5395; paratype, Cat. No. 5407.

### Genus, *Nemodon* Conrad.

*Nemodon mcconnelli* n. sp.

Plate III, figure 6.

*Description.* Compared with the Coloradoan species *Nemodon sulcatus* E. and S., the Peace River form is a little smaller, proportionately longer, the anterior margin makes a right angle or more with the cardinal margin, and the well-defined sulcus of that species is lacking. The surface is ornamented by narrow, radiating, evenly spaced grooves, which are crossed by narrow, evenly spaced, concentric grooves; this forms a square network.

*N. vancouverensis* Meek is much larger and has coarse radiating striæ. The outline and ornamentation resemble that of *Arca murullensis* d'Orbigny from the Neocomien and Aptien of France; but the Alberta species is much more convex and has more prominent beaks. Height 20 mm., length 23 mm. This species is named in honour of R. G. McConnell, Deputy Minister of Mines, Canada.

*Horizon.* Rare in the Peace River formation, Peace river, Alberta.

*Collection.* Victoria Memorial Museum; holotype, Cat. No. 5396.

### Family, PINNIDÆ Meek.

Genus, *Pinna* Linnaeus.

*Pinna curvimarginata* n. sp.

Plate IV, figure 1.

*Description.* In size, proportional expansion, and angularity, this species resembles *Pinna petrina* White from the Coloradoan of New Mexico; but the ventral, not the dorsal, margin is concave and there are differences in the details of surface sculpture—the deflexion of the growth lines below the mesial angle is about midway between the latter and the ventral margin, and the rugose growth lines above the mesial angle are much more inclined to the convex dorsal margin. A few radiating striæ are found below the mesial angle in the most anterior part of the shell. Height 75 mm., length 200 mm.

*Horizon.* Very rare (one specimen) in the Peace River formation, Peace river, Alberta.

*Collection.* Victoria Memorial Museum; holotype, Cat. No. 5397.

Family, PERNIDÆ Zittel.  
Genus, *Inoceramus* Sowerby.

*Inoceramus dowlingi* n. sp.  
Plate III, figures 7, 8.

*Description.* The most important characters of this species are the semi-quadrate outline, compressed form, small terminal beaks, and evenly curved, regular, concentric ridges; it thus resembles *Inoceramus neocomiensis* d'Orbigny from the Lower Greensand of England and the Barremien of France. It differs from the European species in its longer posterodorsal margin, shorter anterior margin, and less high outline. The strength of the concentric ridges near the anterior margin varies from 4 pr. 10 mm., to 6 pr. 10 mm. Height 25 mm., length 24 mm. This species is named after D. B. Dowling.

*Horizon.* Rare in the Clearwater formation, Athabaska river, Alberta.

*Collection.* Victoria Memorial Museum; holotype, Cat. No. 5398; paratype, Cat. No. 5399.

Family, UNIONIDÆ Fleming.  
Genus, *Unio* Retzius.

*Unio dowlingi* n. sp.  
Plate IV, figure 2.

*Description.* There is no Cretaceous species similar to this. The nearest species in general form is *Unio haydeni* Meek from the Eocene of Utah.<sup>1</sup> Compared with this, the Dunvegan species has a thicker shell and a more evenly rounded post-umbonal slope. Height 21 mm., length 30 mm. This species is named after D. B. Dowling.

*Horizon.* Common in the Dunvegan formation, Peace river, Alberta.

*Collection.* Victoria Memorial Museum; holotype, Cat. No. 5400.

Family, TRIGONIDÆ Lamarck.  
Genus, *Trigonia* Boug.

*Trigonia albertaensis* n. sp.  
Plate IV, figures 3, 4.

*Description.* The ornamentation is very characteristic; in the posterior part of the shell five to six costæ are directed downward and backward; anteriorly the costæ are flat V shaped, 135 to 140 degrees, and open downward; about four small radiating costæ are present on the posterior dorsal area. Height 28 mm., length 44 mm.

*Horizon.* Rare in the Peace River formation, Peace river, Alberta.

*Collection.* Victoria Memorial Museum; holotype, Cat. No. 5401; paratype, Cat. No. 5402.

<sup>1</sup>White, U.S. Geol. Surv., 3rd Ann. Rept., p. 435.

Family, MYTILIDÆ Fleming.  
Genus, *Brachydontes* Swainson.

*Brachydontes athabaskaensis* n. sp.  
Plate V, figures 1, 2.

*Description.* Compared with *Brachydontes multilinigera* Meek this species has similarly, a well-defined post umbonal ridge, small incurved beaks, and the radiating surface striæ becoming stronger dorsally and finer ventrally and anteriorly; but it has a less arcuate outline, a straighter umbonal ridge, a hinge-margin less inclined to the anterior margin, a less cuneate posterior outline, it is proportionately narrower, the ventral margin is not strongly incurved, but only slightly so, and the radiating striæ are much finer. The umbonal ridge is followed below by a slight sulcus. It differs from *Brachydontes tenuisculpta* Whiteaves in much the same characters, Whiteaves' species being very close to Meek's; compared with the type specimen, the Athabaska species has much finer radiating sculpture. The radiating striæ of this species are exceedingly fine. Height 16 mm., length 35 mm.

*Horizon.* Rare in the Clearwater formation, Athabaska river, Alberta.

*Collection.* Victoria Memorial Museum; holotype, Cat. No. 5403; paratype, Cat. No. 5404.

Order, **Teleodermacea** Dall.  
Family, TELLINIDÆ Deshayes.  
Genus, *Tellina* Linnaeus.

*Tellina dowlingi* n. sp.  
Plate V, figures 3, 4, 5, and 6.

*Description.* The important character of this species is the subangular anterior end, which gives, in some specimens, a pronounced cuneate outline; the antero-cardinal margin is straight to slightly concave and directed downward at an angle of about 45 degrees; basal margin rounded; postero-cardinal margin straight, parallel to basal margin; posterior margin rounded below, obliquely truncate above; beaks small, subcentral, incurved and curved slightly forward; post umbonal slope rounded, escutcheon broad; lunule very narrow, quite convex to somewhat depressed; surface covered by even lines of growth; ligament external; pallial sinus narrow and subangular. The ratio of height to length varies from 1:1 to 2:3. *Tellina carteroni* d'Orbigny from the Neocomien of France is proportionately longer, more rounded anteriorly, and more depressed. Height 26 mm., length 40 mm. This species is named after D. B. Dowling.

*Horizon.* Rather common in the Peace River formation, Peace river, and in the Clearwater formation, Athabaska river, Alberta.

*Collection.* Victoria Memorial Museum; holotype, Cat. No. 5405; paratypes, Cat. Nos. 5406, 5406a, 5406b.





## EXPLANATION OF PLATE I.

*Cyrtina glabra* n.sp.

Figures 1, 2, and 3. Pedicle, areal, and brachial views of the type specimen, x 2. Crushing of the pedicle valve is responsible for the depressed area shown in figure 2. Geol. Surv., Can., Mus. No. 7968.

*Buchiola retriostrata*.

Figure 4. Right and left valves attached, x 3.

Figures 5 and 6. Fragmentary right valves showing surface sculpture, x 5 and x 3. Geol. Surv., Can., Mus. Nos. 7969, 7969a, 7969b.

*Buchiola dilata* n.sp.

Figure 7. View of the type specimen, x 4. Geol. Surv., Can., Mus. No. 7970.

*Ontaria clarkei*.

8. Right and left valves of a specimen, x 1. Geol. Surv., Can., Mus. No. 7971.

*Paraptyx* cf. *ontario*.

9. View of a part of a right valve, x 1. The concave face of the crescent to the left of the beak bearing three or four indistinct striae is not shown in the figure. Geol. Surv., Can., Mus. No. 7972.

*Bactrites aciculum*.

10. A crushed specimen, x 1. Geol. Surv., Can., Mus. No. 7973.

*Tentaculites mackenziensis* n.sp.

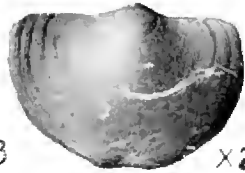
11. View of type specimen, x 5. The abrupt change in width 5 mm. from the tip of the cone is apparent only, not real. It is due to the figure showing immediately above that point the impression and below it the actual shell. Geol. Surv., Can., Mus. No. 7974.



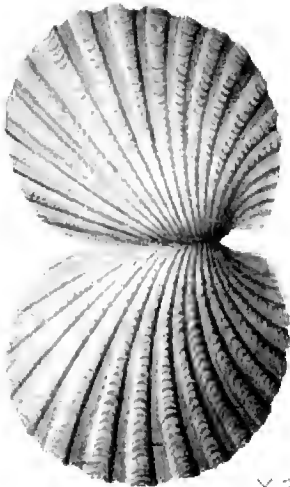
1 X2



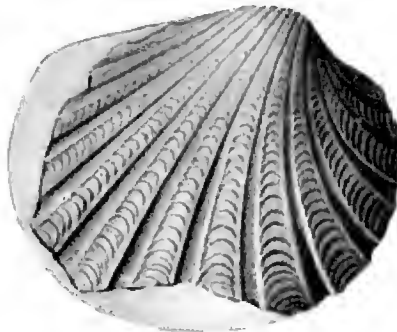
2 X2



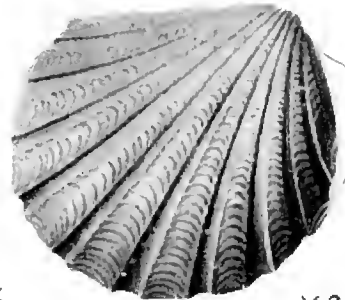
3 X2



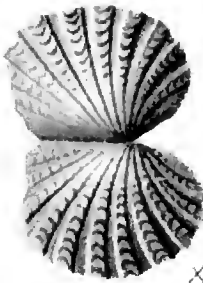
4 X3



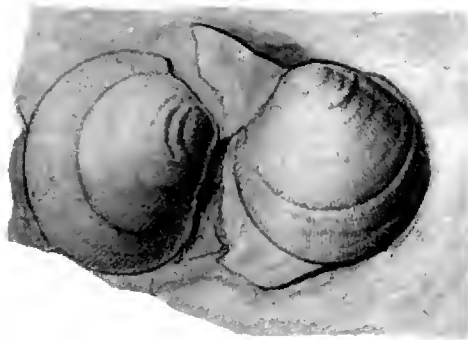
5 X5



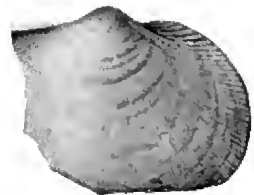
6 X3



7 X4



8 X1



9 X1



10 X1



11 X5





## EXPLANATION OF PLATE II.

*Entomis variostriata.*

- Figure 1. View showing the surface sculpture of specimen without distinct sulcus, x 15.  
Figures 2 and 3. Specimens with well-defined sulcus, x 20. Geol. Surv., Can., Mus. Nos. 7975, 7975a, 7975b.

*Entomis serratostriata.*

- 4 and 5. View of two specimens on slab, x 15.  
Figure 6. View showing detail of ornamentation on end of specimen mostly buried in rock, x 15. Geol. Surv., Can., Mus. No. 7976.

*Entomis brookei* n.sp.

7. View of type specimen. The figure fails to bring out the contrasting coarse and fine ornamentation of the central and surrounding parts (see figure 10).
8. View of another partly crushed specimen, x 15.
9. Specimen showing fine and coarse striæ on opposite sides of shell meeting along diagonal line, x 15.
10. Enlarged square near centre of figure 9, showing the coarse and fine ornamentation, x 30. Geol. Surv., Can., Mus. No. 7977, a, b.



1

x 5



2

x 20



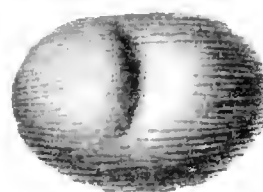
3

x 15



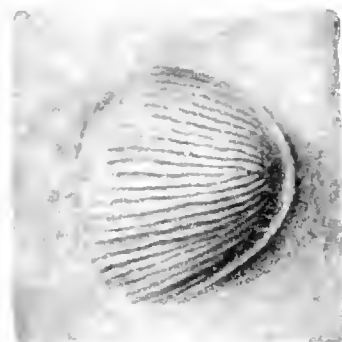
4

x 15



5

x 15



6

x 15



7

x 15



9

x 15



8

x 15



10

x 30



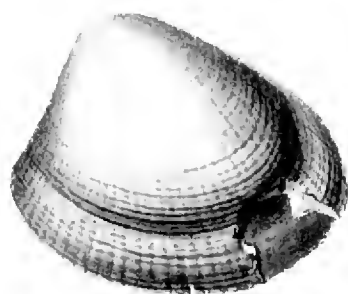




EXPLANATION OF PLATE III.<sup>1</sup>

- Figure 1. *Nucula dowlingi* McLearn n.sp. Right valve x  $1\frac{1}{2}$ , Geol. Surv., Can., Mus. No. 5394, holotype.
2. The same specimen. Posterior view of both valves x  $1\frac{1}{2}$ .
3. *Dicranodonta dowlingi* McLearn n. sp. Posterior view of both valves. Geol. Surv., Can., Mus. No. 5395, holotype.
4. Another view of the same specimen. Right valve.
5. Another specimen of the same. Mould of interior of left valve. Geol. Surv., Can., Mus. No. 5407, paratype.
6. *Nemodon mcconnelli* McLearn n.sp. Right valve x 2. Geol. Surv., Can., Mus. No. 5396, holotype.
7. *Inoceramus dowlingi* McLearn n.sp. Left valve. Geol. Surv., Can., Mus. No. 5398, holotype.
8. The same. Left valve. Geol. Surv., Can., Mus. No. 5399, paratype.

<sup>1</sup>Unless otherwise stated illustrations are natural size.



1



2



3



5



4



6



7



8





EXPLANATION OF PLATE IV.<sup>1</sup>

- Figure 1. *Pinna curvimarginata* McLearn n.sp. Right valve. Geol. Surv., Can., Mus. No. 5397, holotype.  
2. *Unio dowlingi* McLearn n.sp. Right and left valves. Geol. Surv., Can., Mus. No. 5400, holotype.  
3. *Trigonia albertaensis* McLearn n.sp. Left valve. Geol. Surv., Can., Mus. No. 5401, holotype.  
4. The same. Cast of right valve. Geol. Surv., Can., Mus. No. 5402, paratype.

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<sup>1</sup>All illustrations are natural size.







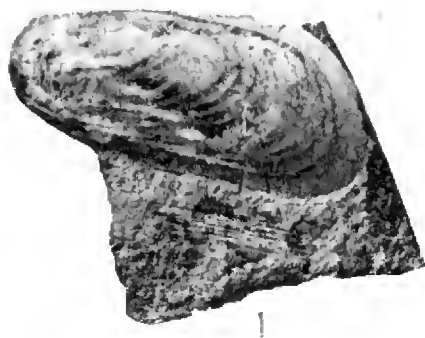


EXPLANATION OF PLATE V.<sup>1</sup>

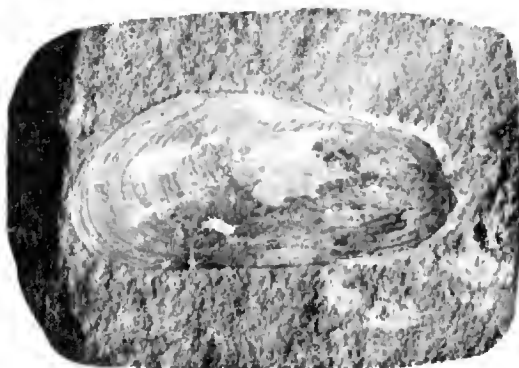
- Figure 1. *Brachydontes athabaskaensis* McLearn n.sp. Left valve, partly exfoliated. Geol. Surv., Can., Mus. No. 5403, holotype.
2. The same. Mould of exterior of left valve. Geol. Surv., Can., Mus. No. 5404, paratype.
3. *Tellina dowlingi* McLearn n.sp. Mould of interior of right valve. Geol. Surv., Can., Mus. No. 5405, holotype.
4. The same. Left valve of a large convex specimen. Geol. Surv., Can., Mus. No. 5406b, paratype.
5. The same. Right valve of a large convex specimen. Geol. Surv., Can., Mus. No. 5406a, paratype.
6. The same. Left valve of a partly exfoliated shell. Geol. Surv., Can., Mus. No. 5406, paratype.

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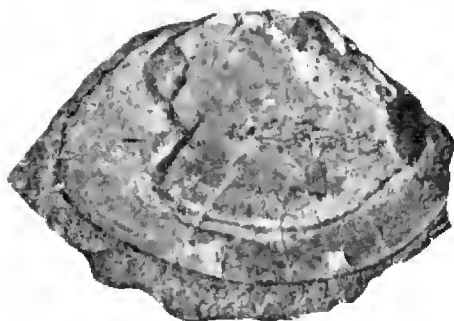
<sup>1</sup>All illustrations are natural size.



1



2



3



4



5



6





